VGA modes for PC computers

LILO, GRUB, and syslinux (Linux bootloaders) all want their VGA values in decimal. The Linux kernel wants VGA values in hexadecimal. The bootloaders do the conversion of the vga parameter from decimal to hexadecimal automatically when they load the kernel.

So how do you know which decimal or hexadecimal numbers to use for which video mode?

When you use the vga=### in GRUB, LILO, or syslinux, use the decimal number listed below that represents the video mode you want to use; for example, to obtain a framebuffer screen from the kernel that is 640x480 in size with 16 bits for color (64k colors), the tables below say 0x311 hexadecimal, so the vga parameter should be vga=785.

If you would like to hardcode this value into the kernel, there are a few ways you can do it:

    * From the kernel source:
        o The video mode to be used is selected by a variable which can be specified in a Makefile in the kernel source. In my 2.6.12 source, the file is $KERNEL_SOURCE/arch/i386/boot/Makefile, and the parameter to set is SVGA_MODE=.... When you compile your kernel, this value gets built into the kernel, and no other settings need to be made. This value needs to be set in hexdecimal (according to $KERNEL_SOURCE/Documentation/svga.txt)
    * From a bootloader:
        o by the vga=### option of LILO/Syslinux/GRUB (or another boot loader). This value needs to be in decimal. See ConvertingToHexadecimal.
    * From the rdev utility:
        o you can hardcode the video mode into the kernel by using the 'vidmode' utility (also known as 'rdev -v') which is present in standard Linux utility packages). See man rdev on your Linux system for more info. I'm not sure if you should be using a decimal or hexdecimal number here.

In case you don't have a scientific calculator handy, I've created a page that explains about using the GNU bc command when ConvertingToHexadecimal. You feed bc the decimal number you want to use for the VGA mode, and it spits out a hexadecimal number.

Table 1: Listing of Video Modes and codes

Colours	640x400	640x480	800x600	1024x768	1152x864	1280x1024	1600x1200
4 bits	?	?	0x302	?	?	?	?
8 bits	0x300	0x301	0x303	0x305	0x161	0x307	0x31C
15 bits	?	0x310	0x313	0x316	0x162	0x319	0x31D
16 bits	?	0x311	0x314	0x317	0x163	0x31A	0x31E
decimal		d785	d788	d791			
24 bits	?	0x312	0x315	0x318	?	0x31B	0x31F
decimal		d786	d789	d792			
32 bits	?	?	?	?	0x164	?	

Here is a better explanation of VESA framebuffer (from Documentation/fb/vesafb.txt):

Table 2: listing of VESA mode numbers

	640x480	800x600	1024x768	1280x1024
256	0x101	0x103	0x105	0x107
32k	0x110	0x113	0x116	0x119
64k	0x111	0x114	0x117	0x11A
16M	0x112	0x115	0x118	0x11B

The video mode number of the Linux kernel is the VESA mode number plus 0x200. So the table for the Kernel mode numbers are:

Table 3: Kernel VESA mode codes

	640x480	800x600	1024x768	1280x1024
256	0x301	0x303	0x305	0x307
32k	0x310	0x313	0x316	0x319
64k	0x311	0x314	0x317	0x31A
16M	0x312	0x315	0x318	0x31B

Sources of documentation used to create this page:
$LINUX_KERNEL_SOURCE/Documentation/svga.txt $LINUX_KERNEL_SOURCE/Documentation/fb/vesafb.txt